COLORADO RIVER RECOVERY PROGRAM **Project No.:108**
FY-2004 PROPOSED SCOPE-OF-WORK for:
Determination of Winter Use and Seasonal Flow
Needs of Colorado Pikeminnow in the Lower Price River

Lead Agency: Utah Division of Wildlife Resources

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Category:
_ Ongoing project
x Ongoing-revised project
_ Requested new project
_ Unsolicited proposal

Expected Funding Source:
_ Annual funds
_ Capital funds
x Other (explain)

NOTE: **This scope requests carryover of existing funds from FY 03 into FY 04, not new appropriations.**

I. Title of Proposal:

Determination of Seasonal Use and Flow Needs of Colorado Pikeminnow in the Price River

II. Relationship to RIPRAP:

Protection of flows in the Price River will:
1) aid recovery of endangered fish species,
2) protect Colorado pikeminnow and its habitat within the Price River, and
3) contribute to maintaining flows in the Green and Colorado Rivers.

General Recovery Program Support:
V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management)

Green River Action Plan:
I.C. Price River
I.C.2. Determine winter use and seasonal flow needs for Colorado pikeminnow in the Price River

III. Study Background/Rationale and Hypotheses:

Historically, large numbers of native fish including Colorado pikeminnow, flannelmouth suckers, bluehead suckers, speckled dace, roundtail chubs, and possibly razorback suckers inhabited the Price River (Quartarone 1993). Impacts resulting from development (i.e., dams, water diversions, water pollution, mineral extraction, highways, railroads, etc.) reduced native fish numbers throughout the Green and Colorado river systems. The native fish community in the Price River experienced all of these impacts.

According to anecdotal accounts and early fish sampling, the native fish community in the Price River appears to have been severely impacted since the early part of the 20th century due to both biotic and physical changes. The extent of these instream habitat and flow alterations is not well understood, nor is the effect on the native fish community, including the endangered Colorado pikeminnow.

Endangered fish were absent from fish surveys in the Price River from the 1950s to the late 1970s. In fact, most biologists familiar with the system believed that endangered fish had been completely extirpated from this river. At the time that the endangered fish of the Colorado and Green rivers were beginning to be studied in earnest in the late 1960s and 1970s, researchers concluded these species to be mainly large river fish that dwelled in the main channels of the Green and Colorado rivers and not within small tributaries. As a result, research and recovery efforts focused on the mainstem systems and tributary communities were largely ignored.

With the proposed construction of the Narrows Dam Project in the headwaters of the Price River, Trout Unlimited sponsored a single, 5-day sampling trip through the lower 20 miles of the Price River to determine the status of the existing fish community. This survey resulted in the capture of one juvenile Colorado pikeminnow 2.2 miles above the confluence of the Green River in 1995. Although possibly anomalous, the capture of this endangered fish was enough to prompt the Bureau of Reclamation to reinitiate consultation with the U.S. Fish and Wildlife Service (Service) to determine if the Narrows Dam Project was likely to adversely

affect Colorado pikeminnow. Because so little was known about the fish community in the Price River in 1995, a two-year study was initiated through the Upper Colorado River Recovery Implementation Program (UCRRIP) to determine the status of the fish community and the presence of endangered fish in the lower 50 miles.

The 2-year study, conducted from April through October in 1996 and 1997, unexpectedly found that juvenile and adult Colorado pikeminnow occupy the lower 50 miles of the Price River in densities comparable to other important reaches of the Green and Colorado rivers. Over 20 Colorado pikeminnow were captured ranging in size from just over 150 mm to nearly 600 mm (Cavalli 1999). In 1998, a Colorado pikeminnow was captured in the Price River 83.5 rivermiles (RM) above the confluence with the Green River, and two more Colorado pikeminnow were captured at the base of the Farnham Diversion at RM 88.5 in 1999. The Farnham Diversion appears to be a barrier to further upstream movement.

The above findings suggest that the Price River may be biologically important to the Green River populations of Colorado pikeminnow. However, it is not known if the Colorado pikeminnow occupy the Price River seasonally or year-round. In addition, this recent data suggests that Colorado pikeminnow may be expanding its range into previously vacant areas.

It is encouraging to find Colorado pikeminnow occupy 88.5 RM of habitat, even without the UCRRIP historically funding any recovery activities in the Price River basin. However, there is currently no assurance that Colorado pikeminnow in the Price River are protected from future water development or habitat destruction in that basin. In an already severely depleted river system, flows that provide 88.5 RM of occupied habitat should be identified and protected to allow continued occupation by endangered fish.

The historical volume of water available in the Price River is estimated to be approximately 157,249 acre-feet (AF). Two existing Federal projects impact the Price River Basin: 1) Price-San Rafael River Salinity Control Project with an annual depletion of 25,310 AF and 2) diversions from Scofield Reservoir with an annual depletion of approximately 55,345 AF (based on 63 percent consumptive use) for average water years. The proposed Narrows Dam and trans-basin diversion will result in an annual depletion of approximately 5,717 AF from the Price River basin. Depletions resulting from the two existing Federal projects have been estimated to total approximately 82,412 AF, resulting in a flow volume that is approximately 47.6% of historic flows. The overall depletion of all Federal projects including the proposed Narrows project will be 88,129 AF. This is a depletion of 56% of historic flows (Bureau of Reclamation 1998). In general, there is little flexibility for control or future improvements to the flow regime.

To maintain and protect occupied habitat in the Price River against future impacts from water depletions and habitat destruction, we must understand the relationship between flow, habitat and endangered fish use of the Price River year-round. Because the 1996–97 study did not investigate endangered fish use from November through March, these data were insufficient to make year-round flow recommendations that will protect existing endangered fish. Moreover, there is no active discharge gage station on the Price River and no accurate flow information available.

Currently, Bureau of Reclamation is awaiting a final Biological Opinion from the Service on the Narrows Dam Project. The Reasonable and Prudent Alternative (RPA) of this opinion is to pay a one-time depletion charge to the UCRRIP of more than $80,000; identify relationships between flow, habitat and endangered fish use year-round; and develop flow recommendations that will protect endangered fish from future impacts. This is important to offsetting the depletion impacts of the Narrows Project and for use on future Section 7 consultations for projects such as the impending reoperation of Scofield Reservoir.

This project was originally scheduled to begin in October 2000. Due to uncertainty of funding for this project and the early onset of winter, Colorado pikeminnow in the Price River were not radio-tagged and monitored during the winter of 2000–2001. The timeline for this project has been pushed back by 4 months, so first winter of Colorado pikeminnow monitoring in the Price River occurred during the winter of 2001–2002, and the second winter occurred during the winter of 2002–2003. This scope of work has been revised to reflect this changed project timeline.

IV. Study Goals, Objectives, End Product:

GOAL: The goal of this study is to acquire year-round flow and habitat information sufficient to protect Colorado pikeminnow in the Price River at their current levels.

OBJECTIVES:

To achieve this goal, the objectives of this research are to:

1. Determine if the lower Price River is used by Colorado pikeminnow from October through March.

2. Generally characterize relationships between flow, habitat use and passage and endangered fish in the Price River.

3. Develop seasonal flow recommendations that will protect Colorado pikeminnow in the lower Price River at their current level.

END PRODUCT:

The data from this research will be synthesized into a final report which documents information collected and recommends seasonal flows necessary to protect Colorado pikeminnow and provide adequate habitats during the times of year that they are present. The resultant flow recommendation will be limited by funding availability and inability to control flows. The flow recommendation will consist of seasonal flows which allow use and passage of endangered fish at their current levels. This will be accomplished by generally characterizing seasonal relationships between flow and habitat and endangered fish.

V. Study Area:

This study will be conducted in the section of the Price River bounded by the confluence with the Green River (RM 0.0) and Farnham Diversion Dam (RM 88.5; the upstream-most point of possible movement).

VI. Study Methods/Approach:

Study Design: A stratified-random sampling design will be employed through which habitat and fish information is randomly sampled among characteristic macrohabitat types within four natural geomorphic reaches.

1) The portion of the Price River from the confluence with the Green River to Farnham Diversion (88.5 RM) will be divided into four natural geomorphic reaches: two alluvial and two canyon reaches.

2) A 1-mile-long characteristic subreach within each geomorphic reach will be selected based on accessibility and reach representation.

Data Collection:

1) Fish data:

   a) Each subsection will be sampled every other month for 2 years through electrofishing to allow comparisons among seasonal catch rates.

   b) Radio-telemetry will be employed during winter months for 2 years to provide information for periods of ice cover and to determine movement and habitat use of Colorado pikeminnow. Radio-tags will be implanted in Colorado pikeminnow during the fall of 2001 and 2002 and these fish will be monitored from October through March.

2) Habitat data:

   a) During the bimonthly sampling, five cross-sections will be permanently marked in each 1-mile subreach. Transects will be selected to represent habitat types. Habitat types may include: pools, runs, riffles and rapids. One cross-section per subreach will be located specifically in a passage-restricted habitat type (shallowest point) to allow evaluation of critical passage flows.

b) Within each of the five cross-sections, the following information will be measured and recorded at 10 points across (10 is the minimum number of points recommended to measure at-a-station discharge):
   - wetted width of the channel
   - water depth
   - water velocity (measured at 0.6 depth)
   - substrate (silt, sand, gravel, cobble, boulder)
   - cover (presence/absence of instream, lateral and overhead cover)

c) Ocular estimates of habitat type composition of each 1-mile sub-reach will be recorded to assess channel characterization and describe percent habitat composition of subreaches at different flow regimes.

d) Macro-habitat type where Colorado pikeminnow are detected will be recorded for each radio-telemetry contact.

e) Historic and current gage data will be used to evaluate seasonal flows and flow regimes.

Data Analysis:

1) Electrofishing data will be correlated with geomorphic reach and habitat type to determine presence/absence and density of Colorado pikeminnow among geomorphic reaches and habitat types. Densities of other large-bodied native fish may also be calculated to evaluate minimum flows necessary to sustain fish passage and inhabitance where Colorado pikeminnow numbers are too low for statistical rigidity.

2) Radio-telemetry information will be used to determine if Colorado pikeminnow occupy the Price River from October through March.

   Radio-telemetry habitat data will be used to evaluate and describe use of specific habitat types by Colorado pikeminnow.

3) Gage discharge data will be related to % habitat type at the range of flow scenarios encountered during the study using chi-squared analysis. The relationship between habitat type and micro-habitat information (depth, velocity, substrate and cover) will be examined through a MANOVA . Micro-habitat descriptions of habitat types will be used to evaluate critical passage flows at flow restricted transects and to determine habitat use and availability at the range of flows encountered.

Critical passage flows will be determined by describing habitat conditions necessary to allow passage by adult Colorado pikeminnow (the minimum depth through which adults will move according to radio-telemetry information and other available data) through designated passage-restricted transects.

Habitat use and availability will be described by % habitat type using Discriminate Functions Analysis of depth, velocity, substrate and cover frequency. Both analyses are necessary to discern the level of habitat use (type or micro) that relates best to fish use.

Discharge will be calculated at each transect (five transects within each 1-mile subreach in each of the four geomorphic reaches) to assess accuracy of the Woodside USGS gage and to evaluate flow losses and gains throughout the four geomorphic reaches.

4) Flow duration curves will be developed for both historic and current discharge data so that % occurrence of critical passage flows can be evaluated. Also, other important features of the hydrograph (spring peak, duration and magnitude) will be evaluated for relationships with presence and/or densities of Colorado pikeminnow.

5) Based on the above analysis, flow recommendations will be developed that include:

    a) a critical passage flow minimum for each of the four reaches.

    b) a seasonal flow range that protects and maintains Colorado pikeminnow (CPM) at their current levels in the Price River.[1]

[1] This flow recommendation is intended to describe a simple relationship between flows that support existing CPM (use and passage) in the Price River based on recently collected biological information. This recommendation is being developed so that these flows can be protected in the future to ensure continued availability to CPM. The information collected is considered the maximum feasible with existing funding and time limitations within the UCRRIP. Limited flexibility in controlling hydrology in the Price River precludes application and usefulness of more sophisticated techniques for developing flow recommendations (i.e. IFIM, PHABSIM) at this time. If, during this effort, a more important role of the Price River is identified (i.e. spawning or YOY habitat), the UCRRIP can decide at a later point to implement additional research efforts.

VII. Task Description and Schedule:

Task 1. Determine if Colorado pikeminnow use the Price River throughout the year.

- Fish and habitat will be sampled in one mile subreaches within four geomorphic reaches in the lower 88.5 RM every other month from May 2001 through April 2003. This data will be related to discharge data collected at the USGS gauge at Woodside, Utah. Data collection and analyses described above.

- Radio tags will be implanted in Colorado pikeminnow during the fall of 2001 and 2002 and these fish will be monitored during the winter months. Data collection and analyses described above.

Task 2. Determine seasonal flow needs of Colorado pikeminnow in the Price River.

- Conduct an analysis of Colorado pikeminnow habitat use and availability the range of flows encountered in the Price River as described above.

- Work on this task will begin when field-work has been completed. A preliminary progress report will be completed after the first year of data collection.

Task 3. Develop year-round flow recommendations for Colorado pikeminnow in the lower Price River.

- Examine current and historic gauge data and relate to Colorado pikeminnow habitat use and availability as described above.

- This task will be addressed after both years of field data have been collected and will be incorporated in the final report.

VIII. FY-2004 Work:

Deliverables/Due Dates

-Draft Final report: 5/04

Budget

-Labor		
1 Biologist	60.3 days @ $315/d	$18,995
1 Technician	48.0 days @ $180/d	$8,640
Project Leader	3.3 days @ $405/d	$1,350
-Subtotal Labor		**$28,985**
-Other expenses (computer costs, printing, etc.)		**$1,800**
-Total		**$30,785***

IX. Budget Summary:

FY-2004	$30,785 *
FY-2005	0
Total	$30,785

***NOTE: This figure is only estimates and does not constitute a request for new funds, but rather a request that any remaining FY 2003 funds for this project (as of 5/21/2003) be carried over into FY 2004. This funding will be used to complete any remaining field work and complete the final report for this project.**

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XI. References:

Cavalli, P.A. 1999. Fish community investigations in the lower Price River, 1996-1997. Final Report prepared for the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin. Project No. 78.

Quartarone, F. 1993. Historical accounts of Upper Colorado River Basin endangered fish. Recovery Implementation Program for Endangered Fish of the Upper Colorado River Basin.